

others, in pale subjects with a tendency to cyanosis, the state of the brain being one of anæmia, with effusion and œdema. According to the author's observation, the latter indications are the more correct. The infusion is doubtless a better preparation than the tincture, and of this a tablespoonful may be administered every four hours.

Some supposed cases of *arachnitis* have been reported cured by digitalis, but grave doubts must exist as to the accuracy of the diagnosis.

Cases of *exophthalmic goitre* in young subjects, purely functional in character, have been cured by *digitalis*, and the cardiac irregularities, and the dilatation of the cervical vessels, ameliorated in even incurable cases. Digitaline is the form in which to employ this remedy, or powdered digitalis may be given in pill, with iron and manganese to remove the anæmia.

Since the anaphrodisiac properties of digitalis were ascertained, it has been much used in *spermatorrhœa*. It is adapted to the same class of cases as those in which ergot has been shown to be so beneficial, viz., feeble erections, frequent emissions, and cold hands and feet. The author has seen better results from the combination of bromide of potassium and digitalis, in the spermatorrhœa of plethora, than from any other remedies: ℞ Inf. digitalis, ℥ viij; potassii bromidi, ℥ j. M. Sig.: A tablespoonful morning and night, and, after a week, at night only.

Digitalis is one of the most generally useful remedies in dropsy which we possess. It is, of course, specially indicated in the mechanical dropsy of valvular lesions. In *renal dropsy* from *acute desquamative nephritis* (tubal nephritis) "of all drugs, digitalis is of the greatest value," and the best form in which to administer it is the infusion. Several days usually elapse before very decisive results are achieved, but the flow of urine is, then, often enormous. The fact that, contrary to what has been heretofore believed, digitalis has a direct action on the glomerule of the kidney, is of great interest in this connection. The author has seen very favorable results from the use of digitalis in *granular degeneration of the kidney* when dropsy supervened, but its use in this disease requires caution in consequence of the fact that the elimination of urea and of the chlorides is retarded by this agent.

*The so-called Cumulative Effects of Digitalis.*—The author agrees in opinion with those who hold that digitalis is not a cumulative poison in the sense in which this term was formerly used. Doses of digitalis frequently repeated, so that the effect of one is added to those before given, will certainly produce toxic symptoms. In this sense opium, belladonna, strychnine, etc., are cumulative poisons. If full doses of digitalis are given at proper intervals, and the effects of one dose are permitted to cease before the next is given, no accumulation will take

place. Sudden toxic symptoms are developed as follows: When, after the administration of large doses, the pulse is much reduced in the recumbent posture, on rising, the heart is suddenly found unequal to maintaining the circulation in face of the increased resistance in the arterioles and against the force of gravity. It must not be forgotten, further, that the irritability of the vaso-motor nervous system may be destroyed by over-stimulation by digitalis, and lethal effects be produced in this way.

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**Convallaria.**—All parts of the plant of *Convallaria majalis* (lily-of-the-valley). (Not official.)

**THE PREPARATIONS.**—It is a remarkable fact that different properties are possessed by extracts made from the various parts of the plant. An extract made from the root has very powerful emeto-cathartic property, while it but little affects the action of the heart. The same fact is true, to a less or greater extent, of extracts from the whole plant. This emeto-cathartic action is due to the presence of a rather acrid resin, and hence for the purpose now intended to be subserved by the administration of convallaria the preparation used must be freed from this resin. An extract prepared from the flowers and



stalks, mixed with a third of their weight of leaves and root, is, according to Langlebert, the best preparation, when deprived of the resin. In this shape it is a solid extract, has a shining black color and a bitter taste, and is freely soluble in water and alcohol.

*Extractum Convallariæ.*—Extract of convallaria. Dose, gr. v—gr. xv.

An infusion of the flowers, leaves, and stems is also used. Troitzky employed several formulas in his trials—from two to four scruples of convallaria to four ounces of water.

*Infusum Convallariæ.*—Infusion of convallaria (convallaria, 50 parts; water, 200 parts). Dose, a tablespoonful. Another formula is eight ounces of convallaria to a pint of boiling water, which is twice the strength of the above.

As the active principle presents many advantages, this will probably be preferred for administration in cardiac affections.

COMPOSITION.—In 1858 Walz announced the presence in this plant of two glucosides—*convallarin* and *convallamarin*. There are important differences in the qualities of these substances. The former, convallarin, occurs in colorless, rectangular prisms, is slightly soluble in water, but freely so in alcohol. Convallarin, as Marmé first ascertained, is a purgative in doses of three or four grains (Husemann). It is probable that the presence of this glucoside in the resin is the secret of the cathartic property of this substance, in part at least. Convallamarin is not crystallizable, is a white powder, bitter, and freely soluble in water and alcohol, but not in ether. The dose when administered by the stomach will range from one fourth of a grain to two grains; but further investigations are needed to decide this point. This is the principle of convallaria, to which its cardiac actions are due. It is probable that the perfectly pure alkaloid possesses much greater activity than the dose above stated indicates.

PHYSIOLOGICAL ACTIONS.—For some time no other powers were attributed to convallaria than those of a cathartic intermediate in action between scammony and aloes. In Russia it has long been known as a remedy for dropsy. This fact finally induced Troitzky and Bojojawlensky to study its action more closely, and Prof. Botkin, of St. Petersburg, subsequently confirmed their researches.

It was not, however, until Prof. Sée undertook the study of its powers and actions, that general interest was aroused, although Marmé had, as is stated above, some time before, given an accurate account of the physiological actions of convallaria. Since the publication of Sée's observations, the actions of this medicament have been investigated by various English and American observers. From these sources, and some personal studies, the author makes up the following account:

Notwithstanding the emeto-cathartic action, if the extract freed

from the resin, or convallamarin, the active principle, is given, no disturbance of the stomach occurs. It stimulates the appetite somewhat, and digestion is not impaired. An increase of peristalsis occurs, and the evacuations, without being loose, become easy. In warm-blooded animals it slows the heart and raises the arterial tension. At the same time the respiratory movements are rendered more full and somewhat less frequent. These effects are due to stimulation of the vagus, but the nerve does not lose its irritability. If the dose be lethal, after this first stage, the heart becomes irregular in rhythm, the force of the cardiac contractions varies, and the respirations are disturbed, inspiration growing deep and prolonged, owing to spasm of the inspiratory group of muscles (Sée). In the third period of the action, just before death, the arterial tension rises very high, but the pulse is exceedingly rapid; then the pressure falls, the respiration growing deeper and very slow, and the heart stops in systole, before the breathing finally ceases. The vagus does not wholly lose its irritability, but near the end a strong faradic current does not stop the heart. The irritability of the motor and sensory nerves remains unaffected, and the muscles preserve their contractility. The pupil is unaffected and the functions of the brain are undisturbed.

The diuretic effect of convallaria is very constant and decided, a fact long known in Russia, but no change occurs in the composition of the urine.

THERAPY.—In suitable doses—15 to 25 grains of the extract—convallaria slows the heart-beats, and often restores the normal rhythm of the heart when disturbed, increases the energy of the cardiac contractions, raises the arterial tension, and at the same time the respiratory movements acquire increased force and volume. These important therapeutical effects are wrought without affecting the functions of the brain and spinal cord. It is also a prompt and certain diuretic, increasing the discharge of all the urinary constituents. The therapeutical indications based on these physiological actions are the following: Palpitation, disordered rhythm, or vehement action, dependent on impaired function of the pneumogastric, or on hypertrophy of the muscular walls; narrowing of the mitral orifice (mitral stenosis) or insufficiency of the mitral valves, with stasis in the venous circulation, with or without spasmodic breathing; dilated heart, with or without fatty change or sclerosis; in all cardiac affections accompanied by dropsy (Sée). The signal advantage which it offers over digitalis is the absence of danger from its administration, and the freedom of the cerebro-spinal axis and the digestive organs from disturbance. It has now been used in the maladies above mentioned by numerous observers in various parts of the world; and, although the reports are not uniformly favorable, there can be no doubt that we have in convallaria an important addition to our resources.



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**Cimicifuga.**—Black snake-root. The rhizoma and rootlets of *Cimicifuga racemosa* Elliott (Nat. Ord. *Ranunculaceæ*). (U. S. P.)

*Extractum Cimicifugæ Fluidum.*—Fluid extract of cimicifuga.

Dose, ʒ ss — ʒ ij.

*Tinctura Cimicifugæ.*—Tincture of cimicifuga. Dose, ʒ ss — ʒ ij.

**COMPOSITION.**—When fresh, the root contains a volatile oil, which possesses in a high degree the characteristic odor of the drug. A true active principle has not yet been isolated, yet Conard has obtained a neutral substance, crystallizable, and having a very acrid taste. The so-called *cimicifugin* is nothing more than an impure resin, obtained by precipitation from the tincture by the addition of water. The root contains resin, coloring matters, tannic and gallic acids.

**ANTAGONISTS AND INCOMPATIBLES.**—As the preparations of cimicifuga contain tannic and gallic acids, they are incompatible with the salts of iron. Stimulants, as alcohol, ammonia, antagonize cimicifuga therapeutically.

**SYNERGISTS.**—In its action, although feeble, cimicifuga lies between digitalis and ergot. Its physiological effects are increased by cold, digitalis, ergot, belladonna, etc.

**PHYSIOLOGICAL ACTIONS.**—The taste of cimicifuga is bitter and astringent, with an after acrid feeling. In small doses, without producing any sensible physiological effect, it promotes the appetite and digestion. In full doses it increases the gastro-intestinal secretions. On the heart and circulatory system, cimicifuga has an action not unlike digitalis, but less powerful: it slows the heart-beats but increases their force, and elevates the tension of the arterial system. Its effects on the nervous system, when administered in large doses, are very decided. It causes vertigo, dilated pupils, and in many subjects considerable soporific and anodyne effects. There is little doubt that it increases the contractility of unstriated muscular fiber in a manner that resembles ergot, but much less energetically. It stimulates the venereal appetite in man, and promotes the menstrual flow in women.

Diaphoresis and increased bronchial secretion are produced by it, and the urine possesses a distinct odor of the drug.

In order to procure physiological effects from cimicifuga, it is essential that preparations made from the fresh root be employed.

**THERAPY.**—Cimicifuga is an excellent *stomachic tonic*, and is especially adapted to the treatment of the *irritative dyspepsia of drunkards*. In *fevers* and *inflammatory disorders*, when the action of the heart is quick and the tension of the vessels low, cimicifuga may take the place of digitalis, but it is much less efficient than the latter. It is an *excellent expectorant*, useful in bronchitis and in neuropathic pulmonary disorders. ℞ Ext. cimicifugæ fl., ʒ ss; tinct. opii deod., ʒ j; syrup. tolu., ʒ xj. M. Sig.: *A teaspoonful every four hours*. This combination is efficacious in *acute catarrh* (common cold), and in *acute bronchitis* after the more active symptoms have subsided. Good results have been obtained from cimicifuga in *phthisis*. It would be idle to claim that it is curative; but, to moderate hectic, to improve the appetite, and to facilitate expectoration, it is undeniably of service. It is in that form of phthisis now called *caseous pneumonia* that cimicifuga can be expected to relieve symptoms, and not in tuberculosis.

*Dilated heart, fatty heart, languid circulation, oppressed breathing, general dropsy*, are conditions in which cimicifuga takes the rôle of digitalis, and although less efficient, it is safer, especially in the case of fatty heart.

Most favorable reports have been made of cimicifuga in *acute rheumatism*. *Chronic rheumatism, with tumefaction of the joints, lumbago, intercostal pain, and myalgia*, are disorders affecting the muscular system, in which this drug sometimes succeeds in a wonderful manner; yet it very often fails, and we are, unfortunately, unable to indicate beforehand the particular kind of cases in which it is most beneficial.

The power of cimicifuga to relieve certain kinds of pain is well established. *Neuralgia of the fifth*, arising from cold, *rheumatic headache, ovarian neuralgia*, succeeding to suppressed or arrested menstruation, etc., are forms of pain in which this remedy is frequently very effective.

*Puerperal mania, hypochondriasis, and convulsions, due to menstrual irregularities*, have been cured by cimicifuga. The greatest successes of this drug have been achieved in *chorea*. It is useful in those cases which arise about the period of puberty, and are connected with disorders or perversions of the menstrual flow.

*Cimicifuga* relieves the pains of *dysmenorrhœa* when of the congestive variety. *Heat of head, flushings of the face, pain in the head, back, and limbs, quick pulse, and nervousness*, when due to arrest of the monthly flow, are often remarkably benefited by this agent. It has been used to promote *parturient pains*, to induce *uterine contractions*.



after delivery, and to relieve after-pains, but it is inferior to ergot for most of these purposes. It is serviceable in *subinvolution of the uterus*, and may be given in combination with ergot.

The aphrodisiac effects of *cimicifuga* render it useful in *spermatorrhœa*. It is not adapted to physiological spermatorrhœa, which is really a condition of normal plethora, but to those cases in which the organs are relaxed, the erections weak, and the seminal discharges feeble and occur on slight excitement.

To obtain curative effects from *cimicifuga*, it must be administered in sufficiently large doses to produce some of its cerebral effects.

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**Belladonna.**—Deadly nightshade.

*Belladonnæ Foliæ.*—Belladonna-leaves. The leaves of *Atropa belladonna* Linné (Nat. Ord. *Solanaceæ*), U. S. P. *Feuilles de belladone*, Fr.; *Tollkraut*, Ger.

*Belladonnæ Radix.*—Belladonna-root. The root of *Atropa belladonna*, as above. *Racine de belladone*, Fr.; *Belladonnawurzel*, Ger.

*Abstractum Belladonnæ.*—Abstract of belladonna. Dose, gr. ss—gr. j. Prepared from the root.

*Emplastrum Belladonnæ.*—Belladonna-plaster. (Belladonna-root and resin-plaster.)

*Extractum Belladonnæ.*—Extract of belladonna. Dose, gr.  $\frac{1}{4}$ —gr. j.

*Extractum Belladonnæ Alcoholicum.*—Alcoholic extract of belladonna. Dose, gr.  $\frac{1}{4}$ —gr. j. Prepared from the leaves.

*Extractum Belladonnæ Fluidum.*—Fluid extract of belladonna. Dose,  $\mathfrak{m}$  j— $\mathfrak{m}$  v. Prepared from the root.

*Tinctura Belladonnæ.*—Tincture of belladonna. Prepared from the leaves. Dose,  $\mathfrak{m}$  v— $\mathfrak{ss}$ .

COMPOSITION.—Belladonna contains a peculiar alkaloid, *atropine*, on the presence of which the physiological activity of the drug depends. This principle is found chiefly in the bark of the root, and of young root. Another principle has also been discovered analogous to atropine, to which the name *belladonnine* has been given. Ladenburg has shown that *belladonnine* is identical with the active principle of *hyoscyamus*, or *hyoscyamine*. It is identical with atropine in composition, and can only differ in the arrangement of its molecules. The root also contains a fluorescent substance and a coloring matter, which

has been called *atrosin*. Atropine exists in the plant in combination with malic acid as *bimalate*.

**Atropina.**—Atropine. Is in yellowish-white, silky, prismatic crystals, without smell, but having a bitter and acrid taste. It is soluble in three hundred parts of water at 60° Fahr., in twenty-five parts of ether, and in much less alcohol. It has a strong alkaline reaction, and forms crystallizable salts with acids.

*Atropinæ Sulphas.*—Sulphate of atropine. Is a white, slightly crystalline powder, very soluble in water and in alcohol, insoluble in ether, and wholly dissipated by heat. Dose, gr.  $\frac{1}{120}$ —gr.  $\frac{1}{60}$ .

ANTAGONISTS AND INCOMPATIBLES.—Caustic alkalies act on atropine, and ammonia is evolved; they are, therefore, incompatible with the preparations of belladonna. As respects physiological antagonism, physostigma and pilocarpus counterbalance the actions of belladonna in almost the whole range of its influence. Opium—within certain limitations to be hereinafter described—antagonizes the actions of belladonna. In cases of poisoning, the stomach should be promptly emptied by emetics (sulphates of zinc or copper), and the nervous disturbances combated, as they arise, by physostigma, opium, or pilocarpus.

PHYSIOLOGICAL ACTIONS.—Dryness of the mucous membrane of the nose, mouth, throat, and larynx, is produced by the direct application of atropine to these parts, and the same effects in a more positive manner follow the stomach or subcutaneous administration. A peculiar bluish appearance of the lips, as well as dryness, the author has frequently observed. Nausea is occasionally produced by belladonna, but this effect is probably due to cerebral disturbance. Dryness of the mucous membrane of the stomach and intestines is doubtless produced by belladonna, but increased secretion occurs subsequently, for the stools are rendered more liquid, and are also voided more frequently. Increased peristalsis is most probably a result of the action of belladonna on the unstriped muscular fiber of the intestines.

The active principle of belladonna (atropine) is an extremely diffusible substance. What changes it induces in the blood, if any, are not known. It affects the circulation in a remarkable manner. In some subjects a decided slowing of the heart takes place immediately after the administration of a considerable dose (atropine hypodermatically), and in all, most probably, an instantaneous retardation of the pulse-rate, but a very decided rise in the number of pulsations quickly follows. Not only is the number of the heart-beats increased, but their vigor also, and the area over which the pulsations are distributed is enlarged. It has been conclusively shown that the increased action of the heart is due, first, to stimulation of the cardiac ganglia of the sympathetic, and, secondly, to a paralyzing action on the pneumogas-